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Publication number: **0 235 438 B1**

12

EUROPEAN PATENT SPECIFICATION

45 Date of publication of patent specification :
02.01.91 Bulletin 91/01

51 Int. Cl.⁵: **A47K 10/34**

21 Application number : **86307602.2**

22 Date of filing : **02.10.86**

64 **Electric paper cabinet.**

30 Priority : **07.03.86 IT 1966286**

43 Date of publication of application :
09.09.87 Bulletin 87/37

45 Publication of the grant of the patent :
02.01.91 Bulletin 91/01

84 Designated Contracting States :
AT BE CH DE FR GB IT LI LU NL SE

56 References cited :
CH-A- 591 232
FR-A- 2 533 124
US-A- 3 730 409

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EP 0 235 438 B1

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Description

The present invention relates to an apparatus for dispensing paper towels of a predetermined length from a supply roll of a continuous paper web.

There are known dispensers of the above type wherein, upon pressing a push button or a lever, a predetermined length of paper web is advanced outside the dispenser so that the user can detach a paper towel by hand, usually by tearing the protruding web length through a pull action against a saw-toothed blade.

The known dispensers have a number of drawbacks, the most relevant of which are the following. The length of the paper web dispensed each time is rigorously predetermined when designing the apparatus and cannot be altered, or only through replacement of a considerable portion of the dispensing mechanism. This is a disadvantage for the manufacturer forced to market more than one model of the same apparatus or to appreciably modify an existing model to meet the requirements of his customers. Moreover, where the dispensed paper length is either too long or too short, there will be a waste of paper since in the latter case the user will draw more than one towel from the apparatus.

A second drawback of prior art dispensers is that the user must positively detach the dispensed web, often causing the apparatus to jam. It is to be noted that the user's hands are wet when tearing the web preventing use of papers with lower tear strength. On the other hand papers formed of two thin sheets are highly desirable for their absorbency, softness and cost, but cannot withstand a pulling action with wet hands.

US-A- 3, 730, 409 discloses according to the pre-characterising part of claim 1 an apparatus for dispensing a predetermined length of a paper web from a paper supply roll, comprising : a housing provided with a slot through which the paper web is fed outside from the roll contained in said housing ; an electric motor, means for advancing the paper web through said slot ; means for transversely cutting at least a part of the paper web protruding outside said slot ; coupling means coupling said motor to said advancing means, said motor when coupled to the advancing means being capable of advancing the paper web through said slot, and a control circuit for driving the motor when coupled to said advancing means for a duration proportional to the predetermined length ; and cutting means including a fixed blade and a movable blade for transversely cutting at least a part of the paper web protruding outside the slot.

Another prior art dispenser is described in US-A- 3,408, 125 which provides for the manual extraction and cutting of a paper strip by the user, while the apparatus stores a fraction of the power received so that after a predetermined number of cycles, a length

of paper to start a new cycle is caused to be fed outward.

US-A-4, 131, 044 describes a dispenser of the above-mentioned type, in which a predetermined paper length is drawn manually while some power is stored at the same time for the subsequent operation of a movable blade for cutting the paper web.

US-A- 3, 697, 146 describes a manually operated dispensing apparatus in which only a prefixed length of paper web can be drawn outside and torn by means of a time preventing the paper web from unrolling. A fraction of the applied power is stored to cause a length of paper to be fed, after tearing, and to remain accessible from outside in order to start the subsequent cycle. The length of the dispensed strip can be previously selected among two or three values by acting onto the dispensing mechanism.

All these devices provide for a completely manual operation, except for the one described in US-A-3, 730, 409 wherein only the feeding operation is motorized and the cut still must be carried out manually by the user. Therefore the above-mentioned drawbacks remain unsolved and even according to the last mentioned patent a certain length of paper is left exposed outside of the apparatus with further inconveniences of hygienic nature.

The present invention is characterised over the apparatus of US-A- 3, 730, 409 in that the motor is a bidirectional motor with its shaft being rotatable in a first direction and in a second direction opposite to the first direction, the coupling means including a first unidirectional coupling means which couples the motor shaft to the shaft of the advancing means for driving the advancing means to advance the paper web only when the motor shaft is rotated in the first direction, and a second unidirectional coupling means which couples the motor shaft to the movable blade of the cutting means for driving the movable blade to at least partially cut the dispensed paper web only when the motor shaft is rotated in the second direction, and wherein the control circuit responds to the operation of a start switch means to cause the motor shaft to be rotated in the first direction and a monitor means determines when the predetermined length of paper web has been dispensed and causes the control circuit to reverse the direction of rotation of the motor shaft.

An example of the invention will now be described with reference to the accompanying drawings in which :

FIGURE 1 is a perspective view showing the dispensing apparatus opened ;

FIG. 2 is a top view of the apparatus of Figure 1 with its cover removed ;

FIG. 3 is a cross-section along line III-III of Fig. 2 showing the apparatus driving gears ;

FIG. 4 is a partial front view showing the driving gears ;

FIG. 5 illustrates the cutting blade for the paper ;
 FIG. 6 is a cross-section along line VI-VI of Fig. 2 illustrating the working of the cutting means ;
 FIG. 7 is a perspective view of the plate supporting the paper web before leaving the apparatus ;
 FIG. 8 is a block diagram of the control circuit of the apparatus ;
 FIG. 9 is a perspective view of a second embodiment of the dispensing apparatus of the present invention, showing the dispensing apparatus in the open position ;
 FIG. 10 is a top view of the apparatus shown in Fig. 9 with its cover removed ;
 FIG. 11 is a fragmentary view showing details of a safety switch of the apparatus, relative to the closing and opening of its cover ;
 FIG. 12 is a fragmentary view illustrating the push button control device for battery operation of the apparatus ;
 FIG. 13 is a fragmentary view illustrating self-centering paper roll brackets of the apparatus ;
 FIG. 14 illustrates the unidirection coupling assemblies of the paper advance and cutter bar drive mechanism for the apparatus ;
 FIG. 15 is a fragmentary view illustrating details of the cutting device mechanism for the apparatus ; and
 FIG. 16 is a block diagram of the control circuit of the apparatus shown in FIG. 9.

As shown in Fig. 1, the apparatus 1 according to the invention comprises a case 1a housing the main components which is closed by a cover 2 connected to the case through hinges 9. Both the case and the cover are preferably made of plastic material by molding. The cover 2 is provided with a central portion 3 that is transparent and partially curved to allow for the supply roll 8 of paper carried by the case. Through the transparent portion 3 the quantity of paper still available can be checked. The cover is further provided with a key lock 48 or the like engaging the case to prevent unauthorized opening, and with an elongated notch 47 cooperating with a similar notch 46 on the front (or lower) portion of the case to define an outlet slot for the paper web.

Since the apparatus is preferably mounted vertically, e.g. against a wall or the like, the case and the cover are further connected by a pair of articulated bars 4 adapted to keep the cover lifted when replacing the paper roll or adjusting the length of the paper web to be cut as will be explained later. When the cover is closed a peg 44 protruding from the inner surface of the cover actuates a safety switch 50 in the case so that upon lifting the cover the apparatus is deenergized.

The case 1a comprises a bottom wall 10, two side walls 11, 12, a front wall 13 and a rear wall 14. The bottom wall 10 is provided with means (not shown) for fastening the apparatus to a wall. A pair of brackets

15 rise from the bottom wall to hold the roll 8 of a continuous paper web 5.

The remaining part of case 1a is divided into three compartments, a central one 71 and two lateral ones 72, 73 (see Fig. 2). The central compartment 71 is defined by the bottom wall 10, by two uprising lateral metal plates 51, 52 and by an upper partially curved plate 60 upon which is supported the paper web 5 unwinding from roll 8 towards the outlet. As it will be illustrated later, the frame 55 formed by plates 51, 52 and 60 carrying the paper driving mechanism, the control circuit board 39 (Fig. 7) and all the other components is detachable from the bottom wall 10 and fastened to it by elastic pawls 24, 57 formed in the bottom wall.

A tiltable plate 30 is pivotally connected to the lateral plates 51, 52 and defines a passage for the web 5. An idle shaft 33 is pivotally mounted on this plate 30 and is provided with a plurality of rollers 35. Plate 30 is further provided with an opening 41 in correspondence of a similar aperture 59 formed in the plate 60, through which protrudes a tongue 40 connected to a switch 49 (Fig. 8) for detecting the exhaustion of the paper web, as will be better explained in the following. In use plate 30 lays in proximity of plate 60 (both preferably of metal) so that the paper web 5 keeps the tongue (40 in Fig. 7) depressed and the associated switch 49 closed. Upon exhaustion of the paper web 5, such to tongue 40 is free to move upward thus opening the associated switch 49 and putting the apparatus out of service. Either condition is displayed outside the dispenser through light indicators 36 or 37, typically LED devices, on the top of the lateral compartment 73 visible on the right portion of Figs. 1 and 2. Both indicators are visible outside through a pair of small holes (not shown) in the cover.

The right-hand compartment is defined by bottom wall 10, side wall 12 and lateral plate 52 and houses a block 45 having a side recess 58, the two above mentioned light indicators 36, 37 and an aperture 43 into which fits the peg 44 upon closure of the cover 2 to close switch 50 connected to the apparatus power supply by depressing tab 42. A photoelectric arrangement 53, 54 is provided in recess 58 for starting the paper dispensing and the cover 2 is correspondingly shaped so that the user can start the apparatus by placing even only one finger in recess 58 even without touching the recess wall. As seen in Fig. 2 the recess 58 houses an aligned pair of cooperating elements such as a LED 53 and a phototransistor 54 connected in a circuit arrangement such as to start a dispensing cycle when the light beam from the LED does not reach the phototransistor. Of course other optical or proximity devices can be used instead of the represented one.

The left compartment 72 is defined by bottom wall 10, side wall 11 and lateral plate 51 and houses the drive gear (82 to 122 in Fig. 3) for advancing and cut-

ting the paper web 5 as will be illustrated later. As can be seen in Fig. 2, an inner housing 16 is formed adjacent the rear wall 14 and covers an electrical transformer (not shown), but the housing 16 is unnecessary when the transformer is placed outside the apparatus, e.g. to meet safety provisions requiring that only a low voltage be present in the dispenser.

Brackets 15 of which only one is shown (see also Fig. 1), holding the paper roll 8 are symmetrically and slidably mounted on rails 28 and elastically pushed toward each other against stop members not shown, by means of compression springs 78 in a housing 29 on the bottom. The upper ends of the brackets 15 carry suitable plugs 17 for engaging a paper roll 8 which can be either provided with a core or not. Since the distance between the brackets is adjustable, rolls of different width can be fitted to the apparatus, while maintaining in any case a self-centering arrangement thanks to the above-mentioned symmetrically slidable and elastically pressed mounting.

A paper roll 8 is easily loaded in the dispensing apparatus by further spacing apart the brackets 15 (i.e. pushing laterally on protruding tabs 19), and then releasing them after positioning the roll between the plugs 17.

The advancing, cutting and control devices are all mounted on the metal frame 55 formed by plates 60, 51 and 52, these latter being provided with engaging means with the bottom wall 10 such as metal blades movable in slots (both not shown) in the bottom wall. Two tab strips 57 are formed in the bottom wall 10 by means of cuts 59 extending along the three sides of a C-shaped and the ends of these tabs abut against the higher portion of wedge-shaped projections 24 sloping down to the bottom. When the frame 55 is positioned in the case, these tabs 57 are elastically biased toward the outside and abutting against the frame 55 to hold it firmly in position. By depressing these tabs and pushing the frame 55 toward the brackets 15, the frame 55 can be disengaged and removed, e.g. for maintenance purposes.

A tiltable door 25 (better shown in Fig. 7) is provided in plate 60 for access to the control circuit board 39 and more particularly to a set of microswitches M for adjusting the length of the dispensed paper web.

The paper web 5 unwinding from roll 8 initially lays over plate 60 and then is guided between plate 60 and plate 30 which is provided with side arms 34 (only one of which is shown), pivotally connected to plates 51, 52 by means of pins 27. Thus the plate 30 can be swung upward when inserting paper web 5. Moreover plate 30 is provided with a longitudinally extending raised portion 38 which abuts against the cover to keep the plate 30 in position when the apparatus is in operation. Plate 30 further carries a plurality of rolls 35 mounted on a common idle shaft 33 connected to plate 30. These rolls 35 partially lean out from plate 30 through openings 32 to contact a

plurality of rollers 63 mounted on frame 55. These rollers are the driving or feed rollers of the paper web and are carried by a shaft 120 in the central compartment 71. As also seen in Fig. 7, shaft 120 is journaled between plates 51, 52 at such a position that rollers 63 partially protrude from plate 60 through an elongated opening 61 in this plate. The surface of rollers 63 is such as to frictionally engage the paper web and for example the rollers are covered with rubber.

Without the paper web 5 interposed, rollers 63 and rolls 35 would be in contact with a certain degree of pressure, so that when paper web 5 is present between plates 60 and 30, it is pressed between them when plate 30 is in its working position.

Referring to FIGS. 2 and 6, a cutting device 85 is provided at the output of paper web 5 from the space between plates 60 and 30. It comprises a fixed blade 31, mounted between plates 51, 52, and a movable blade 56. Blade 31 and blade 56 have sharp edge and both are preferably of steel. The paper web length 6, accessible from outside is still supported by plate 60 and is advanced to the required length between the fixed blade 31 and the blade 56 and it is cut by the movement of the latter in a scissor-like manner as will be described later in detail.

With reference to Figs. 3 and 4 it will now be disclosed the arrangement for advancing and cutting the paper web 5. Fig. 3 is a cross-section taken along line III-III of Fig. 2, showing plate 51 on which a plurality of gears is mounted, whereas Fig. 4 is a plan view of the arrangement.

The shaft 80 of an electric d.c. motor 64 housed in the central compartment 71 passes through plate 51 and carries a pinion 82 engaging the outer teeth of a first toothed wheel 88. The inner teeth 86 of this wheel 88 engage in turn the outer teeth of a second toothed wheel 94 having inner teeth 92 driving a third toothed wheel 102 mounted on pin 100. The first 88 to third 102 toothed wheels form a reduction gear between the motor 64 and two pinions 112 and 122. For clarity sake, in Fig. 4 pinions 112 and 122 are shown as if they were longitudinally spaced apart more than they really are, as can be seen in Fig. 3 where it is clearly shown that wheel 102 meshes with both pinions. Apart from pinion 82, all the gears are preferably of nylon or other plastic material.

Pinions 112 and 122 are connected to shaft 110 and 120 respectively, through one-way clutches 115 and 116. Both pinions are freely rotatable in both directions with respect to plate 51 on which they are supported. Clutch 115 couples to pinion 112 to shaft 110 only when pinion 112 is rotated in a counterclockwise direction, when observing Fig. 3, whereas a clockwise rotation of the same pinion does not drive shaft 110. Moreover a shaped cam 130 having a pin 132 is fastened to shaft 110 and is therefore rotated only when this shaft is rotated.

On the contrary clutch 116 couples pinion 122 to

shaft 120 only when this pinion is rotated clockwise when observing Fig. 3 while disengaging such a shaft during rotation in the opposite direction. The two one-way clutches 115 and 116 may be for example constructed, as represented in Fig. 4, so as to be extremely simple and of low cost, by using a so-called "pinching" or "throttling" spring 109 with some coils wound around a hub 113 co-axial and integral with shaft 110, and other coils wound in an opposite direction on a hub 114 co-axial and integral with shaft 120. One end of the spring 109 is fixed to the case 1a and the other end is free whereby, when the rotation of the two pinions (which has always the same direction) is such as to cause a tightening of coils on one of the two hubs, this is driven in rotation together with the associated shaft, whereas the coils wound in the opposite direction will loosen around the associated hub which is not driven into engagement, thus causing the corresponding shaft to remain stationary. Of course also different types, all known, of one-way clutch could be provided.

In Fig. 3 the arrows show the rotations of the gears for which pinion 122 rotates clockwise, so that it drives shaft 120 with the rollers 63 and the paper web is advanced, whereas pinion 112 although rotating as shown by the arrow, does not drive either shaft 112 or cam 130. On the contrary, when the rotations are reversed, paper advancement is stopped and shaft 110 is rotated. This shaft drives cam 130, as well as an eccentric 139 with pin 136 on the opposite side (see Fig. 4) for actuating the cutting means 85 as will be better described later.

In Figs. 3, 4, 5 and 6 the construction of the cutting means 85 is clearly shown. Blade 31 is fastened at an end to plate 51 and at the other end to plate 52 (Fig. 6) whereas blade 56 is carried by shaft 140 through fastening blocks 142 (e.g. of nylon) allowing for a limited rotation with respect to the fixed blade. The edge of blade 56 is not parallel to blade 31, as between seen in Fig. 4, for a progressive cutting action and is interrupted by a recess 145 in the middle so that a central strip of paper web is left uncut after the cutting step.

The reciprocating movement of blade 56 is obtained through lever 131 and 135, in the left and right compartments respectively. The lever 131, 135 have the same shape and are mounted parallel in the frame. One end (127 in Fig. 4, 128 in Fig. 6) of each lever 131, 135, respectively, is pivotally coupled to the corresponding plate (51, 52) whereas the other ends (125 in Fig. 4, 126 in Fig. 6) are connected together by shaft 140 transversely extending through the frame and supporting the blade 56. The upper ends 133, 134 of blade 56 are further connected to plates 51, 52 by elastic means such as springs 96, shown in Figs. 2 and 3, for a smoother movement.

The middle portion of each lever 131, 135 has a slot 137, 138 (Figs. 4 and 6) housing a pin 132, 136

mounted on a corresponding cam 130, 139. As already mentioned these cams 130, 139 are rigidly connected each other at the ends of shaft 110 which in turn is coupled to pinion 112 by unidirectional clutch 115. A complete rotation of pinion 112 in a counterclockwise direction causes a reciprocating movement of blade 56 as clearly visible in Fig. 6 wherein the upper position of lever 135 and blade 56 is shown in dashed lines. The same figure illustrates in dashed lines the partially lifted cover 2 and plate 30 swung outward.

A device for measuring the length of the dispensed paper web is provided in the right-hand compartment 73 and will be summarily described since it is of convention type (see Fig. 7). It comprises a disc 65 mounted on shaft 120 and provided with a number (e.g. four) of peripheral cuts 66. A detector 68, 69 of the optical type detects the passage of each cut 66 during the advancing rotation of shaft 120 and delivers to the control circuit a number of pulses that is proportional to the length of dispensed web 6.

A block diagram of the electric control circuit 20 of the apparatus is shown in Fig. 8. The terminals of d.c. motor 64 are connected to the outputs 21, 22 of a drive circuit 23 which is controlled by a logical unit 26. The motor 64 is kept at rest by supplying an equal d.c. voltage on both outputs 21, 22 (e.g. 12 V). When one of the outputs, e.g. 21, is brought to a near zero voltage, a voltage difference will be applied to the motor terminals, thus driving the motor in one direction. In reversing the above situation the motor 64 is driven in the opposite direction. Typically the outputs 21, 22 are connected to the collectors of two power transistors (not shown). By driving one of them into a saturation state, its collector will assume a predetermined voltage level, such as a few tenths of volt thus allowing for the motor rotation. Logical unit 26 receives a start pulse from the photoelectric detector 53, 54 which starts the rotation of the motor 64 in the dispensing direction. This rotation is sensed by the above-described monitoring device comprising a disc 65 with peripheral cuts 66 rotated by shaft 120 and a photoelectric detector 68, 69. In this way a number of pulses proportional to the rotation of rollers 63 (that is to the dispensed paper length) is supplied to the logical unit 26. These pulses are stored and their is compared with the preselected configuration set on the described switches M. When a number of pulses has been received that is equal to the selected one, the motor 64 is stopped and its rotation reversed for a predetermined time to accomplish the complete rotation of pinion 112, i.e. the cut of the web 5. A protection circuit 76 disables the drive circuit 23 in case switch 49 (paper exhaustion) is open and further provides for the control of light indicators 36, 37. A d.c. power supply 77 feeds all the circuits and cuts the feeding upon the opening of the cover 2. The following is a brief description of the operation of the dispensing apparatus

according to the invention, as described above.

The apparatus is vertically mounted on a wall or the like and properly connected to the mains for the power supply, so that the light indicators 36, 37 show its state of service. In case the paper roll 8 is exhausted (or the paper web not currently introduced between plates 60 and 30), light 36 signals an out-of-service condition.

To introduce a fresh paper roll 8, the cover 2 is opened by the service personnel with the proper key and lifted until the articulated bars 4 are aligned and kept it open. Upon lifting the cover 2, peg 44 disengages the tab 42, thus opening switch 50 so that the electric power supply is cut off during servicing. A paper roll 8 is mounted and automatically centered between brackets 15 and thereafter plate 30 is tilted forward to correctly position the paper web 5 on rollers 63. Then plate 30 is returned to the original position and the cover 2 is closed again. Paper web 5 is pressed between rollers 63 and rolls 35 by the closed cover 2 pressing on raised portion 38 of plate 30, rollers 35 being slightly displaced against the action of spring means (not shown) on which the shaft 33 of idle rollers is mounted. Paper web 5 further presses tongue 40 of switch 49 so that the out of service indicator 37 is off when the cover 2 is closed and paper web 5 in place.

In case the length of the paper towel is to be changed, before introducing the web 5 between plates 60 and 30, the operator opens door 25 and sets a different configuration on the microswitches M of the control circuit board 39. These switches (for example four) represent how many elementary lengths of paper web 5 will be dispensed before the web is cut. As an example, in case all the switches are set on, the maximum length of paper will be dispensed. If only the first switch is sent on and all the remaining are off, the length of the dispensed paper web will be half of the maximum, and so on, according to the rules of binary arithmetics. As an example, the elementary length chosen for the apparatus can be in the order of 2 cm and the maximum length dispensed at each cycle would be 15 times this length, corresponding to binary configuration 1111 of the switches. A table showing the correspondence between the towel length and the configuration of the switches can be attached to plate 60 for easy reference.

When the user moves a finger in recess 58 he interrupts the light beam between the LED 53 and the phototransistor 54 thus starting the dispensing cycle. Known circuit arrangements can be provided to disable further actuation of the apparatus for a predetermined time. The control circuit 23 will drive the motor 64 in a direction such as to rotate rollers 63 and advance the paper web 5 out of the dispenser apparatus. The rotation of shaft 120 carrying the driving rollers 63 will be monitored by the control circuit which compares the number of pulses received from the above-

mentioned photoelectric device 68, 69 with the predetermined number deriving from the set switches M. Upon detecting the identity of the two numbers, motor 64 is stopped and driven in the opposite direction for a complete rotation of pinion 112. This way blade 56 performs a reciprocating movement cutting almost completely the protruding web 6 and returning to the original position. Since a narrow middle strip of paper web is left uncut by the presence of recess 145 in blade 56, the towel 6 will remain hanging below the dispenser and can be easily detached by the user. After the cutting, the apparatus is ready for another dispensing cycle.

Referring to FIGS 9 and 10, there is illustrated a further embodiment of the paper towel dispensing apparatus provided by the invention and indicated generally by reference numeral 1'. The apparatus 1' is generally similar to the apparatus 1 illustrated in FIGS. 1 and 2, and accordingly, like elements have been given the same reference numeral and similar elements have been given the same reference numeral with a prime rotation.

The apparatus 1' is battery-powered and the internal housing 16 formed near the rear wall 14 contains the battery holder (not shown). The battery may be, for example, nine elements of 1.5 volts each. The battery holder includes suitable connectors for extending power to the elements of the apparatus 1'. Preferably, the housing 16 may be adapted to be opened to allow substituting the individual battery elements only from the inside of the apparatus 1' in order that access is possible exclusively to authorized personnel.

Additional modifications of the apparatus 1' relative to the apparatus 1 reside in the elimination of the optical devices, which require continuous emission of light, in order to minimize drain on the battery.

To this end, the indicators 36 and 37 (FIG. 1) are eliminated, and the photoelectric arrangement 53, 54 is replaced with a microswitch assembly 53' mounted on the underside of cover 2 and contacts 36a and 37a which are mounted in a lateral block 45'. Block 45' corresponds to block 45 in the apparatus 1, but is formed with a pair of recesses 58' within which the contacts 36a and 37a are mounted. Referring to FIG. 12, the microswitch assembly 53' includes a microswitch 53a, a mounting plate 170 on which the microswitch 53a is mounted and screws 54 which secure the plate 170 to the posts 172 in the underside of the cover 2. The microswitch 54a provides an input to the logic unit 26 (FIG. 16) in place of the optical detectors 53, 54 (FIG. 8) of the apparatus 1 (FIG. 1).

As it is better seen in Fig. 12, block 45' mounts the two contacts 36a and 37a which, upon closing of the cover 2 of apparatus 1, are connected with the terminals of microswitch 53a provided for the starting of the operative cycle of the machine. The microswitch 53a, when operated, interconnects contacts 36a and 37a

via its contacts and plate 170 to a connect power to the logic circuit 26 (FIG. 14) which energizes the motor 64.

The start microswitch 53a is advantageously fixed on the under side of the cover 2 by means of screws 54 which, besides fixing the plate 170 onto which the microswitch is mounted, engage the contacts 36a and 37a of the block 45a upon closing of the cover 2. Plate 170, for example, may include conductive portions dispersed in electrically conducting relation with screw 54, and adapted to be interconnected by the microswitch contacts when the microswitch 53a is operated. Access to the microswitch 53a preferably takes places without direct contact, by means of an elastic membrane 171 provided on cover 2, onto which it is sufficient to exert a slight pressure in order to start the operation cycle. Naturally other control devices may be used in lieu of the mentioned microswitch, but preferably avoiding optical devices which require a continuous emission of light, in order to reduce as far as possible the consumption of the battery.

In accordance with another aspect of the invention, the apparatus 1' includes an improved safety device for cutting off the power from the apparatus 1' when the cover 2 is lifted. With reference to FIG. 11, the cover 2 is provided with a peg 44 as in the apparatus 1 shown in FIG. 1, but which, in contrast thereto, does not actuate switch 50' by simply lowering a tab projecting therefrom as for apparatus 1' shown in Fig. 6. In the apparatus 1, the opening 43 provided in the right-hand compartment of the apparatus enables peg 44, passing through it upon closing the cover 2, to depress a lever 150 which pivots about arm 152a about pivot 154, rotating arm 152b therewith, against the force of restoring spring 153 which is connected between the free end of arm 152b and the paddle 151 of a transmission element 152. Depressing of element 152 closes switch 50' connected with the power supply of the apparatus.

In the apparatus 1' the brackets 15', which carry the paper roll 8 are represented schematically in FIGS. 9 and 10 as well as, in greater detail, in FIG. 13 wherein they are represented symmetrically slidable in a self-centering fashion, under the push of a tension spring 78. The self-centering characteristic of brackets 15' is realized by means of an idle gear transmission 155 which mutually connects the brackets 15' to each other by means of rack-type toothed profiles 156 solidly fixed or integral to the brackets themselves. In such a way, displacing one of the two brackets from its equilibrium position determined by the spring 78, the gear 155 rotates by a certain number of teeth, thus displacing by the same number of teeth in an opposite direction the rack relative to the other bracket 15' so that the two brackets always moves symmetrically with respect to a center axis passing through the rotating shaft of gear 155. The self-centering brackets may

be used in dispensing apparatus for paper towels powered by electric distribution network, such as the apparatus 1 shown in FIG. 1.

The apparatus 1' also includes a modified unidirectional spring type control for the operation of the shafts 110 and 120, which control the paper cutting mechanism and the paper advancement mechanism, as will be described. The modified control may be used in the apparatus 1' shown in FIG. 1. With reference to Fig. 14, the pinions 112' and 122', both moved by a power shaft 80 (FIG. 3) through a kinematic chain, such as that for the apparatus 12 in (FIG. 3), are connected respectively with said shafts 110 and 120 through unidirectional couplings 160' and 161' of opposite direction. Both pinions may rotate freely in both directions with respect to the plate 51 onto which they are mounted. The coupling 160' couples pinion 112' with shaft 110 only when such a pinion is rotated in a determined first direction, while a rotation in the opposite direction of the same pinion does not drive shaft 110.

The coupling 161' connects pinion 122' with shaft 120 only when this pinion is rotated in an opposite direction with respect of said first direction, while it disengages shaft 120 during rotation of the pinion in the other direction. The two unidirectional couplings 160' and 161' are made, according to the present invention, as shown in FIG. 14, thus been extremely reliable though been simple and unexpensive. To this end, only two springs 162' and 163' of the so-called "pinching" or "throttling" type are used being wound, respectively, in opposite directions, over the hub 113' co-axial and integral with the shaft 110 and over the hub 114 which is in turn co-axial and integral with the shaft 120. One end of each spring 162', 163' is fixed to the corresponding pinion 112' and 122' respectively, while the other is free so that, when rotation of the two pinions (which takes place always in the same direction) is such to cause a tight clamping of the coils over one of the two hubs, the latter is driven in rotation together with the corresponding shaft, while the coils of the other coupling, wound in the opposite direction, will loosen around the associated hub which shall not be driven into engagement thus causing the corresponding shaft to remain stationary.

To the aim of ensuring that such a shaft which is not to be rotated remains effectively still, a reversal device is provided which is formed by a double spring of the "pinching" type 109' would with a portion of its coils 115' around a second hub 113a' co-axial and integral with said first hub 113' on shaft 110 and having a second portion of coils 116' wound around another hub 114a' co-axial and integral with hub 114' on shaft 120. With one or the other of said portions 115' and 116', said spring 109' blocks one or the other hub, and the associated shaft, whichever is left free by the associated spring 162' or 163', preventing any accidental reaction.

Referring to FIG. 15, the cutting device 85' for apparatus 1' is operated as described and shown for the cutting device 85 (FIG. 5) for the apparatus 1 illustrated in FIG. 1, by a cam 130 rigidly connected to one end of the shaft 110 and provided with a pin 132 running in a slot of a lever 131. At the other end, a similar device (such as cam 139 with the pin 136 illustrated in FIG. 6) ensures the correct operation of the cutting device 85' formed by a stationary blade and a mobile blade. With reference to FIGS. 15 and 16, a paddle 165 is rigidly connected with the lever 131 by a screw 166 (similarly another paddle rigidly fixed with lever 135 is mounted on the opposite side of the apparatus), while the small shaft 127 onto which lever 131 is pivotally mounted, may move with respect to paddle 165 sliding in a slot 164 formed therein. At the end of the cutting step of the paper web, rotation of pinion 112' still continues until said paddle, in its movement represented with dash lines in FIG. 15, blinds a photoelectric sensor 167 which, as shown in FIG. 16 is connected with the logic unit 26 in parallel with the photoelectric detector 68-69, causes the motor to stop. It should be noted that the energization of the logic unit 26 is determined by closing of the microswitch 53a. It should be noted further that whenever the paper roll 8 is exhausted (or if the paper web is not properly inserted between plates 60 and 30 of FIG. 9) the cycle would not be activated. The paper web 5, when correctly inserted, presses down the tab (indicated with 40 in FIG. 7) associated with the switch 49 of FIG. 16 which thus enables the performance of the working cycle through microswitch 53a with the cover 2 closed and therefore contacts 36a and 37a preset and switch 50 closed.

As in apparatus 1 (FIG. 1), before introducing the paper web 5 between plates 30 and 60, the operator may preset a different combination of the microswitches M of the electronic circuit board 39 (FIG. 7) to program the number of elementary lengths of paper web that will be dispensed before the web is cut, each time the microswitch 53a is operated to initiate a dispensing cycle.

Possible additions and/or variations can be performed by those skilled in the art to the above-described and illustrated embodiment of the dispensing apparatus according to the invention, as defined in the following claims.

Claims

1. Apparatus for dispensing a predetermined length of a paper web (5) from a paper supply roll (8), comprising a housing (1A, 2) provided with a slot (46, 47) through which the paper web is fed outside from the roll contained in the housing; an electric motor (64) having a shaft (80), advancing means (33, 35, 120, 63) including a shaft (120), at least one roller

(63) carried by the shaft, and an idle roll (35) facing the roller, the paper web being pressed between the roll and the roller for advancing the paper web through the slot; coupling means (116, 122) coupling the motor to the advancing means, the motor when coupled to the advancing means being capable of advancing the paper web through the slot, and a control circuit (20) connected to a source (77) of power for driving the motor when coupled to the advancing means for a duration proportional to the predetermined length; and cutting means (85) including a fixed blade (31) and a movable blade (56) for transversely cutting at least a part of the paper web protruding outside the slot; characterized in that the motor is a bidirectional motor with its shaft being rotatable in a first direction and in a second direction opposite to the first direction, the coupling means including a first unidirectional coupling means (116, 122) which couples the motor shaft to the shaft (120) of the advancing means for driving the advancing means to advance the paper web only when the motor shaft is rotated in the first direction, and a second unidirectional coupling means (115, 112) which couples the motor shaft to the movable blade (56) of the cutting means (85) for driving the movable blade to at least partially cut the dispensed paper web only when the motor shaft is rotated in the second direction, and wherein the control circuit responds to the operation of a start switch means (53, 54) to cause the motor shaft to be rotated in the first direction and a monitor means (65, 68, 69) determines when the predetermined length of paper web has been dispensed and causes the control circuit to reverse the direction of rotation of the motor shaft.

2. An apparatus according to Claim 1, wherein said cutting means (85) further includes lever means (131, 135) pivotally mounted on said housing and supporting said movable blade (56) at each end, and cam means (130, 139) engaged by said lever means, said second unidirectional coupling means coupling said cam means to said motor shaft when driven in said second direction for driving said cam means whereby said lever means imparts reciprocating movement to said movable blade.

3. An apparatus according to Claim 2, wherein the coupling means includes a first pinion (122), a second pinion (112) and a transmission gear (82) connecting the motor shaft with a common toothed wheel (88) rotatable in both directions, said toothed wheel simultaneously meshing with said first (122) and said second (112) pinion, wherein said first unidirectional coupling means comprises a first clutch (116) interposed between said first pinion and the shaft carrying said roller, for operatively connecting said first pinion to said shaft only when said first pinion is rotating in said first direction, and wherein said second unidirectional coupling means comprises a second clutch (115) interposed between said second pinion and a

further shaft (110) which carries said cam means (139, 130) for operatively connecting said second pinion to said cam means only when said second pinion is rotating in said second direction.

4. An apparatus according to Claim 3, wherein said first and second clutches each comprise a spring (109) wound around a hub (113, 114) rigidly fixed to the associated shaft (120, 110) and having one end free and another end fixed to the respective pinion (122, 112) so that rotation in a determined direction of the two pinions causes loosening of the coils wound on the hub which remains free and tightening of the coils wound on the other hub which is thus driven into rotation.

5. An apparatus according to Claim 4, wherein said coupling means includes further a double spring of the "pinching" type (109') for stopping the shaft which is not driven into rotation, the spring being wound partially on one and partially on the other of two further hubs (113'a, 114'a) coaxial and rigidly fixed, respectively, to the shafts associated with said two first hubs.

6. An apparatus according to Claim 2, wherein the edge of said movable blade (56) extends at an angle to the fixed blade, and is interrupted by a central recess (145) whereby a narrow central strip of the paper web is left uncut after a complete reciprocating movement of said movable blade.

7. An apparatus according to Claim 1, wherein said start switch means comprises a proximity device (53, 54) including a light source (53) and a light detector (54) spaced apart in a recess formed on the outside of the housing for detecting the presence of an object between them.

8. An apparatus according to Claim 1, wherein said start switch means has contact means (36a, 37a) connected in circuit with said control circuit, a microswitch (53a), and mounting means (54, 170) mounting said microswitch within said housing, said housing having a cover portion (2) formed with an aperture therethrough, said microswitch being located near said aperture, and means (171) secured to said cover portion in said aperture for facilitating operation of said microswitch.

9. An apparatus according to Claim 8, wherein said mounting means mounts said microswitch to the undersurface of said housing cover portion, said cover portion being movable between closed and open positions carrying with it said microswitch, and said mounting means including means (170) electrically connecting said microswitch to said contact means when said cover portion is in its closed position.

10. An apparatus according to Claim 1, wherein said source of power comprises at least one battery.

11. An apparatus according to Claim 1, further including a safety switch (50) mounted within said housing and connected in circuit with said source of

power, said housing having a cover portion (2) with a projection (44) extending rearwardly thereof within said housing, and further coupling means (150, 152) coupling said projection to said safety switch for operating said safety switch when said cover portion is in its closed position for connecting at least said control circuit to said source of power only when said cover portion is in its closed position, said coupling means including a transmission member (152), means (154) movably mounting said transmission member within said housing, and bias means (153) biasing said transmission member out of engagement with said safety switch, said transmission member being moved by said projection against the force of said spring into engagement with said safety switch as said cover portion is moved to its closed position.

12. An apparatus according to Claim 2, including optical sensing means (167) connected in circuit with said control circuit, and said leer means including a rotatably mounted element (165) disposed in operative relationship with said optical sensing means to cause said optical sensing means to generate an end of dispensing cycle signal after the cutting means has been actuated to cut the web.

13. An apparatus according to Claim 2, including a frame (55) comprising two parallel plates (51, 52) perpendicular to the bottom wall of said apparatus and a partially curved support plate (60) connecting together said plates, and an additional plate (30) mounted on said support plate being pivotably mounted on said parallel plates to swingably move with respect to said support plate, the paper web to be dispensed being passed between said support plate and said additional plate.

14. An apparatus according to Claim 13, and further including a safety switch (49) having a resilient tongue (40) extending through an opening (59) in said support plate in correspondence with an opening (41) in said additional plate (30) for engaging the paper web, whereby said switch is actuated by said tongue to an opened state in the absence of the paper web (5) between said support plate (60) and said additional plate (30).

15. An apparatus according to Claim 1, wherein said paper supply roll is supported by means of a pair of brackets (150) slidably mounted on the bottom wall (10) of the housing, elastic means (78) continuously pushing said brackets toward each other to center paper rolls of different widths supported thereby.

16. An apparatus according to Claim 1, including a pair of brackets (151) for supporting said paper supply roll within said housing, each of said support brackets having a rack portion (156) with an idle pinion means (155) which simultaneously engages both rack portions, said idle pinion means rotatable on an axis through which passes through the center plane of symmetry for said brackets.

17. An apparatus according to Claim 1, wherein

said bidirectional electric motor (64) is a d. c. electric motor and said control circuit (20) comprises drive means (23) to feed said motor with a reversible voltage difference, said control circuit (20) further comprising means (26) to compare a number represented by a preselected binary configuration with the number of pulses generated at a constant speed during the advancement of the paper web.

Ansprüche

1. Vorrichtung für die Ausgabe einer vorbestimmten Länge einer Papierbahn (5) von einer Papierzuführrolle (8), bestehend aus einem Gehäuse (1A,2) mit einem Schlitz (46,47) durch welchen die Papierbahn nach außen von der im Gehäuse befindlichen Rolle geführt wird, einem elektrischen Motor (64) mit einer Welle (80), Vorschubmitteln (33, 35, 120, 63) mit einer Welle (120), wenigstens einer Walze (63) auf der Welle und einer leerlaufenden Rolle (35), die der Walze gegenüberliegt, wobei die Papierbahn zwischen der Rolle und der Walze beim Vorschub der Papierbahn durch den Schlitz zusammengepreßt wird; Kupplungsmitteln (116, 122), die den Motor an die Vorschubmittel ankuppeln, wobei der Motor in der Lage ist, die Papierbahn durch den Schlitz vorzuschieben, wenn er an die Vorschubmittel angekuppelt ist, und einer an eine Stromquelle (77) angeschlossenen Steuerschaltung (20) zum Antrieb des Motors, wenn diese mit den Vorschubmitteln für eine Dauer, welche proportional der vorbestimmten Länge ist, gekoppelt ist; und einer Schneideinrichtung (85), die ein festes (31) und ein bewegliches Messer (56) aufweist zum Querschneiden wenigstens eines Teiles der Papierbahn, die aus dem Schlitz herausragt, dadurch gekennzeichnet, daß der Motor als Zweirichtungsmotor ausgebildet ist mit einer Welle, die in eine erste Richtung und in eine zweite, zu der der ersten Richtung entgegengesetzten Richtung drehbar ist, daß die Kupplungsmittel eine erste, in eine Richtung wirkende Kupplungseinrichtung (116, 122) aufweisen, die die Motorwelle an die Welle (120) der Vorschubmittel ankuppeln zum Antrieb der Vorschubmittel zwecks Vorschubs der Papierbahn nur, wenn die Motorwelle in die erste Richtung gedreht wird, und eine zweite in eine Richtung wirkende Kupplungseinrichtung (115, 112), welche die Motorwelle an das bewegliche Messer (56) der Schneideinrichtung (85) ankuppelt zum Antrieb des beweglichen Messers, um das ausgegebene Papier wenigstens teilweise nur dann zu schneiden, wenn die Motorwelle in die zweite Richtung gedreht wird, und wobei die Steuerschaltung auf die Betätigung einer Startschalteinrichtung (53, 54) anspricht, um die Motorwelle in die erste Richtung drehen zu lassen, und wobei eine Überwachungseinrichtung (65, 68, 69) bestimmt, wann die vorgegebene Länge der Papierbahn ausgegeben ist,

und die Steuerschaltung veranlaßt, die Drehrichtung der Motorwelle umzukehren.

2. Vorrichtung nach Anspruch 1, bei welcher die Schneideinrichtung (85) eine Hebelanordnung (131, 135), die schwenkbar an dem Gehäuse befestigt ist und das bewegliche Messer an jedem Enden abstützt, und Nockenmittel (130, 139) aufweist, die mit der Hebelanordnung zusammenwirken, umfaßt, wobei die zweite, in eine Richtung wirkende Kupplungseinrichtung die Nockenmittel an die Motorwelle ankuppelt, wenn diese in die zweite Richtung getrieben wird zum Antrieb der Nockenmittel, und wobei die Hebelanordnung dem beweglichen Messer eine hin- und hergehende Bewegung verleiht.

3. Vorrichtung nach Anspruch 2, bei welcher die Kupplungsmittel ein erstes Ritzel (122), ein zweites Ritzel (112) und ein Übertragungsgetriebe (82), das die Motorwelle mit einem in beide Richtungen drehbaren Zahnrad (88) verbindet, aufweisen, wobei das Zahnrad gleichzeitig mit dem ersten (122) und dem zweiten Ritzel (112) in Eingriff ist, wobei die erste, in eine Richtung wirkende Kupplungseinrichtung eine erste Kupplung (116) aufweist, die zwischen dem ersten Ritzel und der Welle, die die Walze trägt, eingesetzt ist, um bei Betrieb das erste Ritzel mit der besagten Welle nur zu verbinden, wenn das erste Ritzel in der ersten Richtung rotiert, und bei der die zweite, in eine Richtung wirkende Kupplungseinrichtung eine zweite Kupplung (115) aufweist, die zwischen das zweite Ritzel und eine weitere Welle (110) eingesetzt ist, welche die Nockenmittel (139, 130) trägt, die das zweite Ritzel mit den Nockenmitteln verbindet, wenn das zweite Ritzel in der zweiten Richtung rotiert.

4. Vorrichtung nach Anspruch 3, bei der die erste und die zweite Kupplung jeweils eine Feder (109) aufweisen, die um eine Nabe (113, 114) gewunden ist, die starr an der zugeordneten Welle (120, 110) befestigt ist, und wobei ein Ende frei und das andere Ende an das entsprechende Ritzel (122, 112) befestigt ist, so daß Rotation der zwei Ritzel in einer bestimmten Richtung das Lösen der um die eine Nabe, welche freibleibt, geschlungenen Windungen, und das Festlegen der um die andere Nabe geschlungenen Windungen bewirkt, welche so in Drehung versetzt wird.

5. Vorrichtung nach Anspruch 4, bei welcher die Kupplungsmittel eine Doppelfeder zum Blockieren der Welle, die nicht in Rotation versetzt wird, aufweisen, wobei die Feder teilweise auf die eine und teilweise auf die andere zweier weiterer Naben (113'a, 114'a) gewunden ist, die koxial und drehstarr an den jeweiligen Wellen, die mit den zwei erstgenannten Naben verbunden sind, befestigt sind.

6. Vorrichtung nach Anspruch 2, bei welcher die Schneide des beweglichen Messers (56) sich in einem Winkel zu dem feststehenden Messer erstreckt und durch eine zentrale Vertiefung (145) unterbrochen ist, wobei ein schmaler Mittelstreifen der Papier-

bahn nach einer vollständigen Hin- und Herbewegung des beweglichen Messers ungeschnitten bleibt.

7. Vorrichtung nach Anspruch 1, bei welcher die Startschalteinrichtung eine Schaltanordnung (53, 54) umfaßt, die eine Lichtquelle (53) und einen Lichtdetektor (54) aufweist, die in einem Abstand voneinander in einer Ausnehmung, welche auf der Außenseite des Gehäuses gebildet wird, angeordnet sind zum Ermitteln der Anwesenheit eines Objektes zwischen ihnen.

8. Vorrichtung nach Anspruch 1, bei welcher die Startschalteinrichtung Kontaktmittel (36a, 37a), die in die besagte Steuerschaltung eingeschaltet sind, aufweist, einen Mikroschalter (53a) und Befestigungsmittel (54, 170), die den Mikroschalter innerhalb des Gehäuses befestigen, wobei das Gehäuse einen Deckelteil (2) aufweist, der mit einer Öffnung versehen ist und der Mikroschalter in der Nähe dieser Öffnung angeordnet ist, und wobei mit dem Deckelteil verbundene Mittel (171) in der Öffnung zur Erleichterung der Betätigung des Mikroschalters vorgesehen sind.

9. Vorrichtung nach Anspruch 8, bei welcher die besagten Befestigungsmittel den Mikroschalter an der Unterseite des Gehäusedeckelteils befestigen, wobei der zwischen einer geschlossenen und einer geöffneten Stellung bewegliche Deckelteil den Mikroschalter mit sich trägt, und wobei die Befestigungsmittel Mittel (170) zum elektrischen Verbinden des Mikroschalters mit den Kontaktmitteln umfassen, wenn der Deckelteil in seiner geschlossenen Stellung sich befindet.

10. Vorrichtung nach Anspruch 1, bei welcher die Stromquelle wenigstens eine Batterie aufweist.

11. Vorrichtung nach Anspruch 1, welche weiterhin einen Sicherheitsschalter (50) aufweist, der innerhalb des Gehäuses befestigt und in den Stromkreis der Stromquelle geschaltet ist, wobei das Gehäuse einen Deckelteil (2) mit einem vorspringenden Ansatz (44) auf seiner dem Gehäuseinnern zugewandten Unterseite besitzt, sowie weitere Kupplungsmittel (150, 152) zum Ankoppeln des Ansatzes an den besagten Sicherheitsschalter zur Betätigung dieses Sicherheitsschalters, wenn der Deckelteil sich in seiner geschlossenen Stellung befindet, um wenigstens die Steuerschaltung nur dann mit der Stromquelle zu verbinden, wenn der Deckelteil sich in seiner geschlossenen Stellung befindet, wobei die Kupplungsmittel ein Übertragungsglied (152), Mittel (154), die das Übertragungsglied innerhalb des Gehäuses beweglich befestigen, und Vorspannmittel (153) die durch eine Vorspannung das Übertragungsglied außer Eingriff mit dem Sicherheitsschalter halten, umfassen, wobei das Übertragungsglied durch den Ansatz gegen die Kraft der besagten Feder in Eingriff mit dem Sicherheitsschalter gebracht wird, wenn der Deckelteil in seine geschlossene Stellung bewegt wird.

12. Vorrichtung nach Anspruch 2, bei welcher optische Sensormittel (167) in den Stromkreis der Steuerschaltung eingeschaltet sind, und die Hebelanordnung ein drehbar gelagertes Element (165) aufweist, das mit den optischen Sensormitteln zusammenwirkt, um die optischen Sensormittel zur Erzeugung eines Signals zur Beendigung des Ausgabesyklus zu veranlassen, nachdem die Schneideinrichtung zum Schneiden der Bahn betätigt worden ist.

13. Vorrichtung nach Anspruch 2, bei welcher ein Rahmen (55) vorgesehen ist, der zwei parallele Platten (51, 52) umfaßt, die senkrecht zum Boden der Vorrichtung angeordnet sind, sowie eine teilweise gekrümmte Halteplatte (60), die die besagten Platten miteinander verbundet, und eine zusätzliche Platte (30), die an der Halteplatte befestigt und an den besagten parallelen Platten schwenkbar befestigt ist, um sich schwenkbar in Bezug auf die Halteplatte zu bewegen, wobei die auszugebende Papierbahn zwischen der Halteplatte und der zusätzlichen Platte hindurchbewegt wird.

14. Vorrichtung nach Anspruch 13, die weiterhin einen Sicherheitsschalter (49) aufweist, der eine fedemde Zunge (40) hat, welche durch eine Öffnung (59) in der besagten Halteplatte ragt, die in Übereinstimmung ist mit einer Öffnung (41) in der besagten zusätzlichen Platte (30) zur Aufnahme der Papierbahn, wobei der besagte Schalter durch die besagte Zunge bei Abwesenheit der Papierbahn (5) zwischen der besagten Halteplatte (60) und der besagten zusätzlichen Platte (30) in einen offenen Zustand geschaltet wird.

15. Vorrichtung nach Anspruch 1, bei welcher die Papierzuführrolle auf einem paar Armen (150) gelagert ist, die gleitend verschiebbar auf dem Gehäuseboden (10) befestigt sind, wobei elastische Mittel (78) vorgesehen sind, die ständig die beiden Arme aufeinander zubewegen, um darauf gelagerte Papierrollen unterschiedlicher Breite zu zentrieren.

16. Vorrichtung nach Anspruch 1, die ein paar Arme (151) zum Lagern der Papierzuführrolle innerhalb des Gehäuses umfaßt, wobei jeder der Lagerarme einen Zahnradteil (156) aufweist mit einem leerlaufenden Ritzel (155), das gleichzeitig mit beiden Zahnradteilen in Eingriff ist, wobei das leerlaufende Ritzel um eine Achse drehbar ist durch welche die Symmetriemittelebene für beide Arme verläuft.

17. Vorrichtung nach Anspruch 1, bei welcher der elektrische Zweirichtungsmotor (64) ein elektrischer Gleichstrommotor ist und die Steuerschaltung (20) Antriebsmittel (23) umfaßt, um den Motor mit einer umkehrbaren Spannungsdifferenz zu speisen, wobei die Steuerschaltung (20) weiterhin Mittel (26) aufweist zum Vergleichen einer durch eine vorgewählte, binäre Konfiguration dargestellten Zahl mit der Anzahl von Impulsen, die bei konstanter Geschwindigkeit während des Vorrückens der Papierbahn

erzeugt werden.

Revendications

1. Appareil pour distribuer une longueur prédéterminée d'une bande de papier (5) à partir d'une bobine de papier de réserve (8), comprenant un boîtier (1A, 2) muni d'une fente (46, 47) à travers laquelle la bande de papier est avancée vers l'extérieur à partir de la bobine logée dans le boîtier ; un moteur électrique (64) ayant un arbre (80), des moyens d'avance (33, 35-120, 63) comprenant un arbre (120), au moins un rouleau (63) supporté par l'arbre, et un galet fou (35) placé face au rouleau, la bande de papier étant comprimée entre le galet et le rouleau pour qu'elle avance à travers la fente ; des moyens d'accouplement (116, 122) reliant le moteur aux moyens d'avance, le moteur une fois relié avec les moyens d'avance étant capable de faire avancer la bande de papier à travers la fente, et un circuit de commande (20) connecté à une source d'alimentation (77) pour entraîner le moteur lorsqu'il est accouplé aux moyens d'avance pendant une durée proportionnelle à la longueur prédéterminée ; et des moyens de coupe (85) comprenant une lame fixe (31) et une lame mobile (56) pour couper transversalement au moins une partie de la bande de papier qui sort à l'extérieur par la fente ; caractérisé en ce que le moteur est un moteur bidirectionnel dont l'arbre peut tourner dans un premier sens et dans un second sens opposé au premier, les moyens d'accouplement comprenant des premiers moyens d'accouplement unidirectionnel (116, 122) qui mettent en prise l'arbre du moteur et l'arbre (120) des moyens d'avance pour entraîner les moyens d'avance et faire avancer la bande de papier seulement quand l'arbre du moteur tourne dans le premier sens, et des seconds moyens d'accouplement unidirectionnel (115, 112) qui associent l'arbre du moteur à la lame mobile (56) des moyens de coupe (85) pour entraîner la lame mobile et lui faire au moins partiellement couper la bande de papier distribuée uniquement lorsque l'arbre du moteur tourne dans le second sens, et en ce que le circuit de commande est déclenché par l'actionnement d'un commutateur de démarrage (53, 54) pour provoquer la rotation de l'arbre du moteur dans le premier sens tandis que des moyens de surveillance (65, 68, 69) déterminent à quel moment la longueur prédéterminée de bande de papier a été distribuée et déclenchent le circuit de commande en vue d'inverser le sens de rotation de l'arbre du moteur.

2. Appareil selon la revendication 1, caractérisé en ce que lesdits moyens de coupe (85) comprennent en outre des moyens de levier (131, 135) montés pivotants sur le boîtier et supportant la lame mobile (56) à chacune de ses extrémités, des moyens de came (130, 139) en prise avec lesdits moyens de

levier, les seconds moyens d'accouplement unidirectionnel accouplant lesdits moyens de came audit arbre moteur lorsqu'il est entraîné dans le second sens pour entraîner ces moyens de came de façon que lesdits moyens de levier fasse subir un mouvement alternatif à ladite lame mobile.

3. Appareil selon la revendication 2, caractérisé en ce que les moyens d'accouplement comprennent un premier pignon (122), un second pignon (112) et un engrenage de transmission (82) reliant l'arbre du moteur avec une roue dentée commune (88) pouvant tourner dans les deux sens, la roue dentée étant simultanément en prise avec le premier pignon (122) et le second pignon (112), en ce que les premiers moyens d'accouplement unidirectionnel comportent un premier embrayage (116) intercalé entre le premier pignon et l'arbre portant ledit rouleau pour relier fonctionnellement ledit premier pignon audit arbre uniquement lorsque ledit premier pignon tourne dans ledit premier sens, et en ce que lesdits seconds moyens d'accouplement unidirectionnel comprennent un second embrayage (115) intercalé entre le second pignon et un autre arbre (110) qui porte lesdits moyens de came (139, 130) pour relier fonctionnellement le second pignon audit moyen de came uniquement lorsque ledit second pignon tourne dans ledit second sens.

4. Appareil selon la revendication 3, caractérisé en ce que les premiers et seconds embrayages comportent chacun un ressort (109) enroulé autour d'un moyeu (113, 114) rigidement fixé à l'arbre associé (120, 110) et ayant une extrémité libre et une autre extrémité fixée au pignon correspondant (122, 112) afin que la rotation dans un sens déterminé des deux pignons entraîne d'une part le desserrage des spires enroulées sur le moyeu qui reste libre et le serrage des spires enroulées sur l'autre moyeu qui est ainsi entraîné en rotation.

5. Appareil selon la revendication 4, caractérisé en ce que les moyens d'accouplement comprennent en outre un double ressort type à "pincement" (109') pour arrêter l'arbre qui n'est pas entraîné en rotation, le ressort étant enroulé partiellement sur l'autre de deux autres moyeux (113'a, 114'a) co-axiaux et rigidement fixés respectivement aux arbres associés auxdits deux premiers moyeux.

6. Appareil selon la revendication 2, caractérisé en ce que le bord de la lame mobile (56) est orienté sous un certain angle par rapport à la lame fixe, et interrompu par une encoche centrale (145), de sorte qu'une languette médiane étroite de la bande de papier est laissée non coupée à la fin d'un mouvement alternatif complet de la lame mobile.

7. Appareil selon la revendication 1, caractérisé en ce que les moyens commutateurs de démarrage comportent un dispositif de détection de proximité (53, 54) composé d'une source lumineuse (53) et un détecteur de lumière (54) éloigné de la source dans

un évidement formé à l'extérieur du boîtier pour détecter la présence d'un objet entre eux.

8. Appareil selon la revendication 1, caractérisé en ce que le commutateur de démarrage est composé de contacts (36a, 37a) branchés dans le circuit dudit circuit de commande, un microcommutateur (53a) et des moyens de montage (54, 170) pour fixer ce dernier à l'intérieur dudit boîtier, qui comporte un capot (2), dans lequel une ouverture est ménagée pour recevoir ledit microcommutateur et des moyens (171) associés à l'ouverture du capot pour faciliter l'actionnement du microcommutateur.

9. Appareil selon la revendication 8, caractérisé en ce que le microcommutateur est fixé dans les moyens de montage sur la face inférieure du capot du boîtier qui est déplaçable entre des positions ouverte et fermée en entraînant avec lui le microcommutateur, tandis que les moyens de montage comprennent des moyens (170) de connexion électrique du microcommutateur et des moyens de contact lorsque le capot se trouve dans sa position fermée.

10. Appareil selon la revendication 1, caractérisé en ce que ladite source d'alimentation est constituée d'au moins une pile.

11. Appareil selon la revendication 1, caractérisé en ce qu'il comprend en outre un interrupteur de sécurité (50) monté à l'intérieur du boîtier et relié à la source d'alimentation, ledit boîtier comportant un capot (2) avec une saillie (44) orientée vers l'arrière du capot à l'intérieur dudit boîtier, des moyens d'accouplement (150, 152) reliant la saillie à l'interrupteur de sécurité pour manoeuvrer cet interrupteur quand le capot se trouve dans sa position fermée afin de connecter au moins le circuit de commande à la source d'alimentation uniquement lorsque le capot se trouve dans sa position fermée, tandis que les moyens d'accouplement comprennent un élément de transmission (152), des moyens (154) de montage de l'élément de transmission à l'intérieur du boîtier, et des moyens (153) changeant l'élément de transmission hors de contact dudit interrupteur de sécurité, ledit élément de transmission étant déplacé au moyen de la saillie à l'encontre de l'action dudit ressort pour venir en prise avec l'interrupteur de sécurité quand le capot est déplacé jusqu'à sa position fermée.

12. Appareil selon la revendication 2, caractérisé en ce que des moyens de détection optique (167) sont connectés avec le circuit de commande, et en ce que les moyens de levier comportent un élément monté en rotation (165) installé en relation fonctionnelle avec les moyens de détection optique pour que les moyens de détection optique génèrent un signal de fin de cycle de distribution lorsque les moyens de coupe ont été actionnés pour couper la bande.

13. Appareil selon la revendication 2, caractérisé en ce qu'il comprend un cadre (55) constitué de deux plaques parallèles (51, 52) perpendiculaires au fond

de l'appareil et une plaque support (60) partiellement courbée reliant entre elles lesdites plaques, et une plaque supplémentaire (30) montée sur ladite plaque support est montée pivotante sur lesdites plaques parallèles pour se déplacer en oscillant par rapport à ladite plaque support, la bande de papier à distribuer passant entre ladite plaque support et ladite plaque supplémentaire.

14. Appareil selon la revendication 13, caractérisé en ce qu'il comprend en outre un interrupteur de sécurité (49) portant une languette élastique (40) traversant une ouverture (59) de ladite plaque support en correspondance avec une ouverture (41) dans ladite plaque supplémentaire (30) pour venir en contact avec la bande de papier, de façon que ledit interrupteur soit actionné par la languette pour être amené en un état ouvert en l'absence de bande de papier (5) entre ladite plaque support (60) et la plaque supplémentaire (30).

15. Appareil selon la revendication 1, caractérisé en ce que la bobine de papier de réserve est supportée au moyen de deux supports (150) montés à coulissement sur la paroi inférieure (10) du boîtier, des moyens élastiques (78) poussant en permanence lesdits supports l'un vers l'autre pour centrer les bobines de papier de différentes largeurs supportées entre elles.

16. Appareil selon la revendication 1, caractérisé en ce qu'il comprend deux supports (151) pour maintenir la bobine de papier de réserve à l'intérieur du boîtier, chacun desdits supports comportant une crémaillère (156), tandis qu'un pignon (155) montré fou sur un axe passant par le plan central de symétrie desdits supports est simultanément en prise avec les deux crémaillères.

17. Appareil selon la revendication 1, caractérisé en ce que le moteur électrique bidirectionnel (64) est un moteur à courant continu et en ce que le circuit de commande (20) comprend des moyens (23) pour alimenter le moteur avec une différence de tension réversible, ledit circuit de commande (20) comprenant en outre des moyens (26) pour comparer un nombre représenté par une configuration binaire pré-sélectionnée avec le nombre d'impulsions formées à vitesse constante pendant l'avance de la bande de papier.

Fig. 1

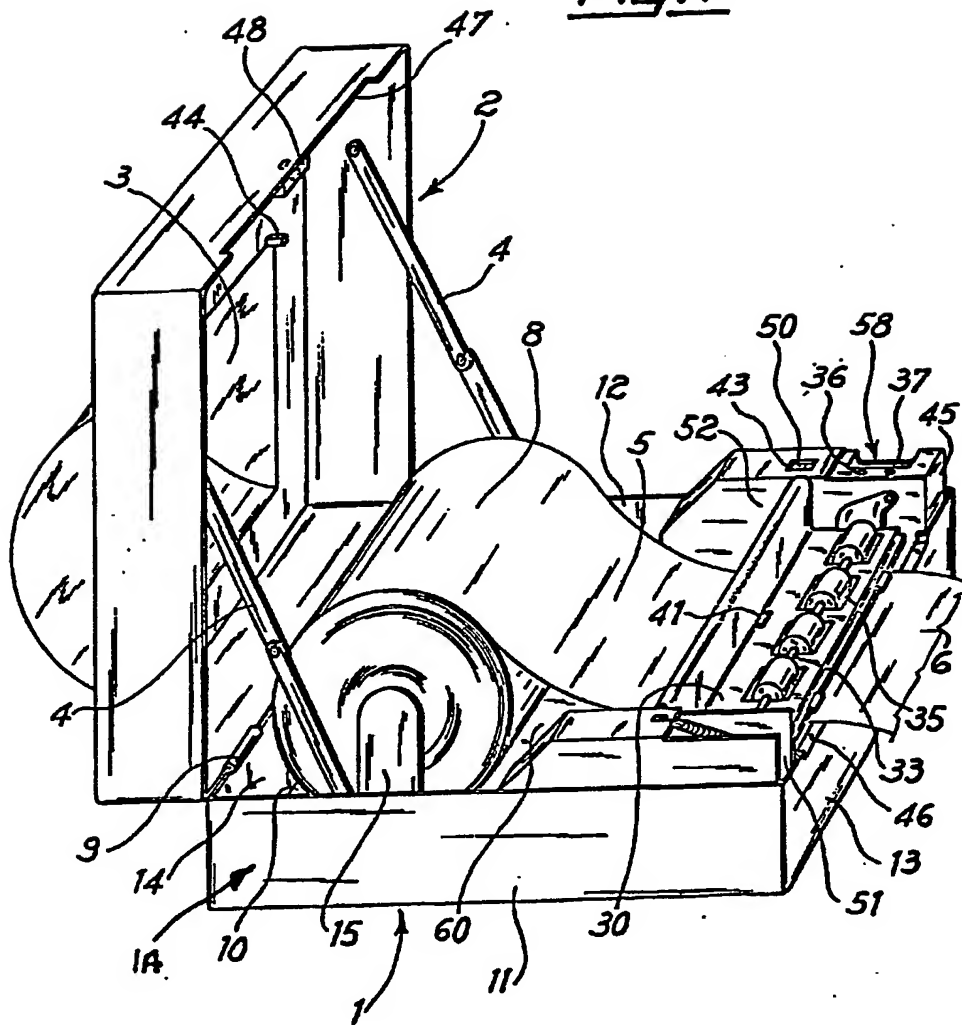
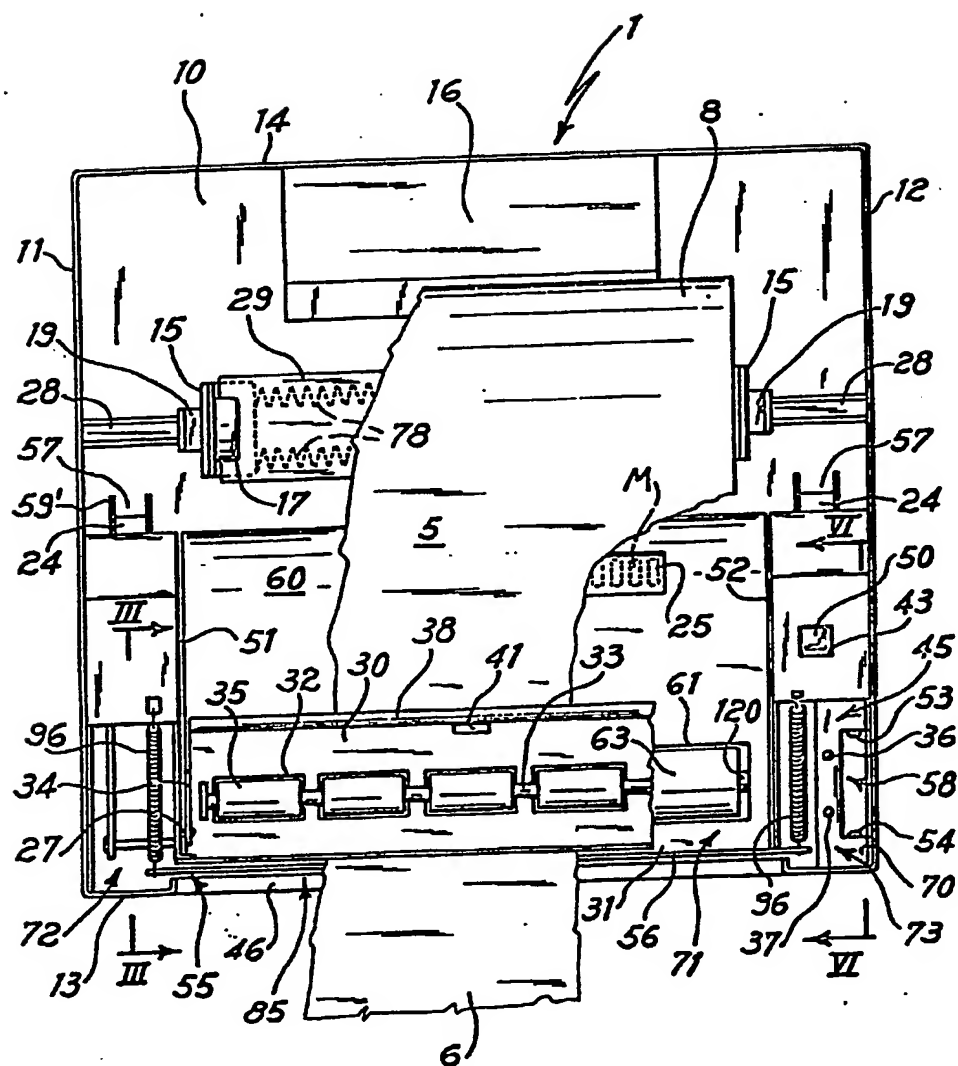
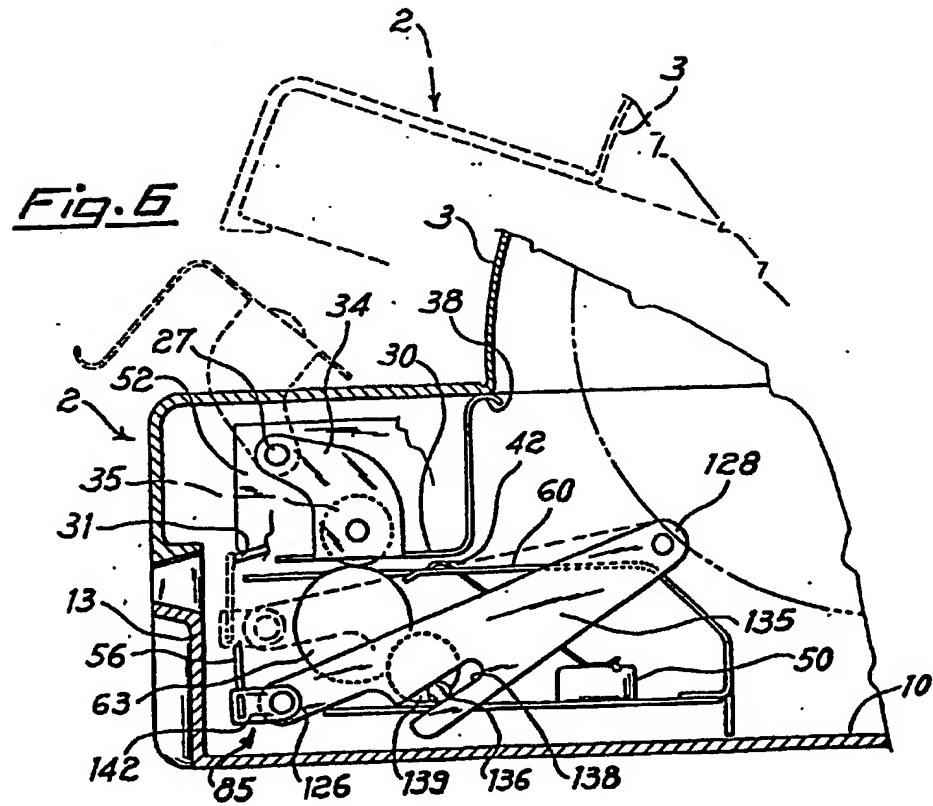
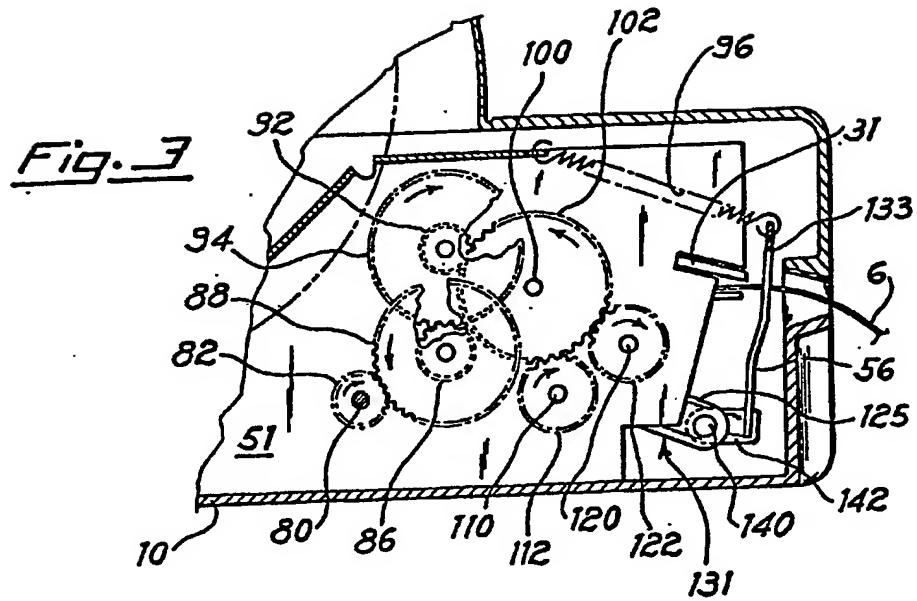
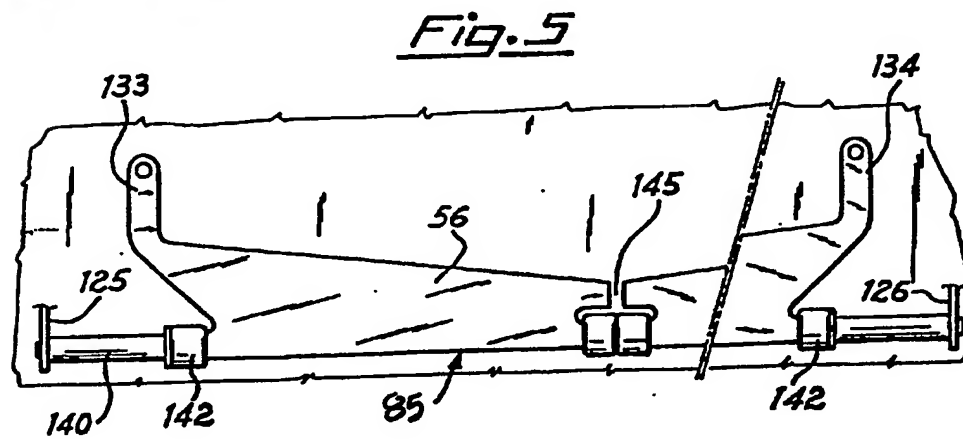
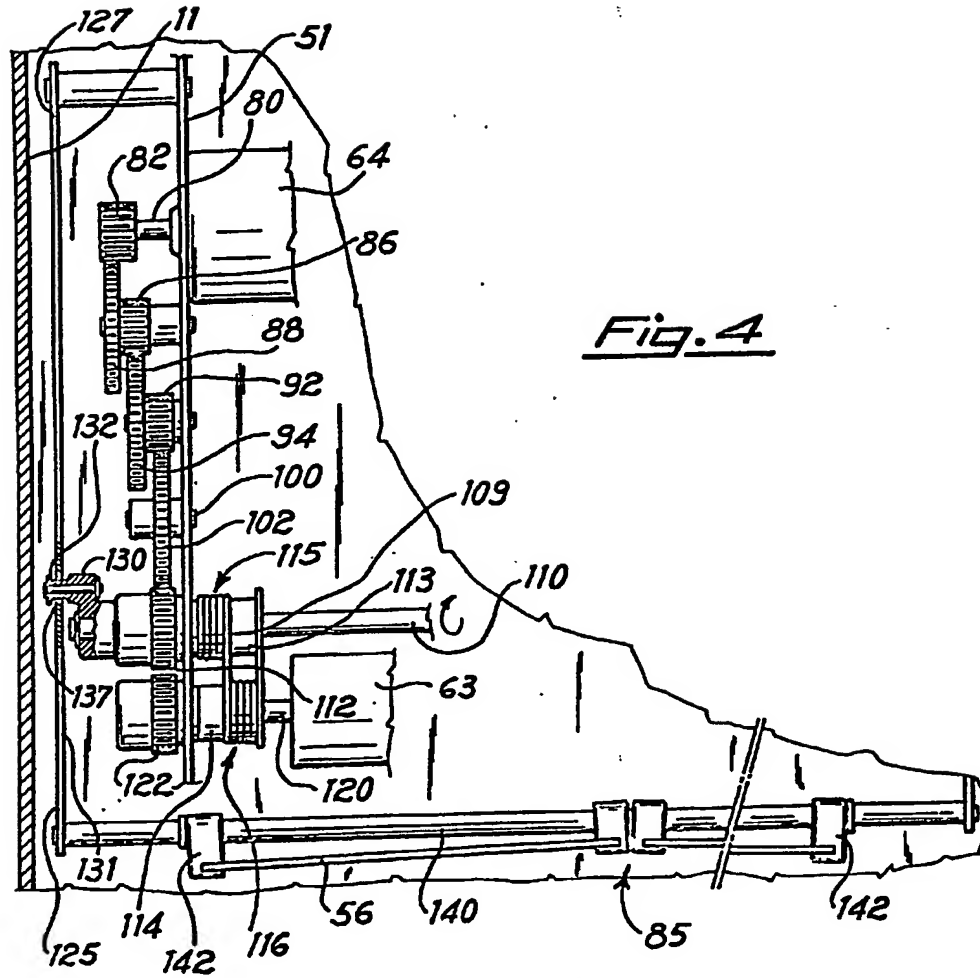


Fig. 2







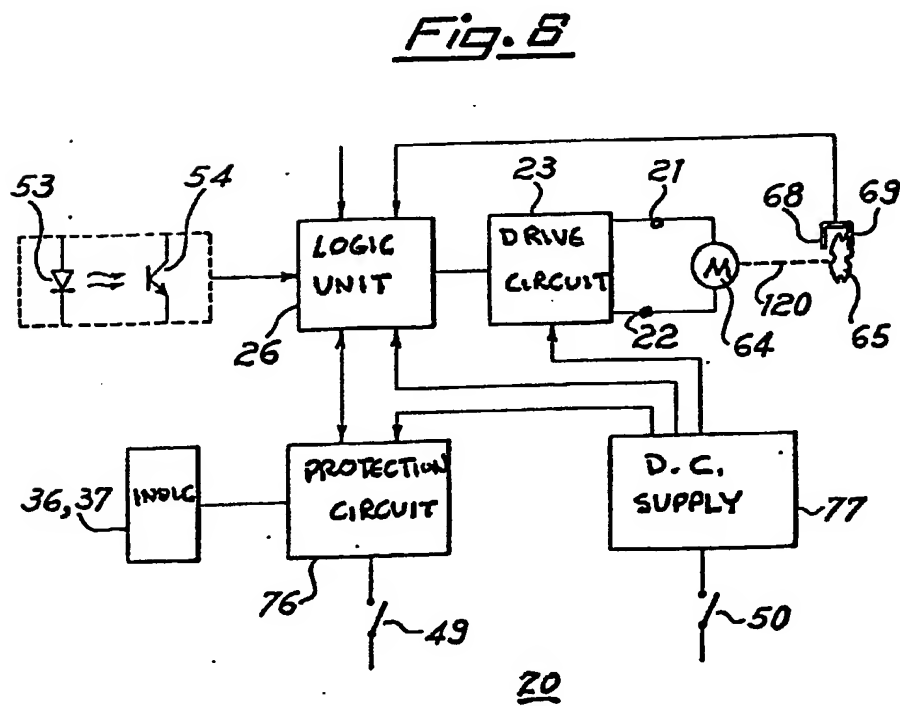
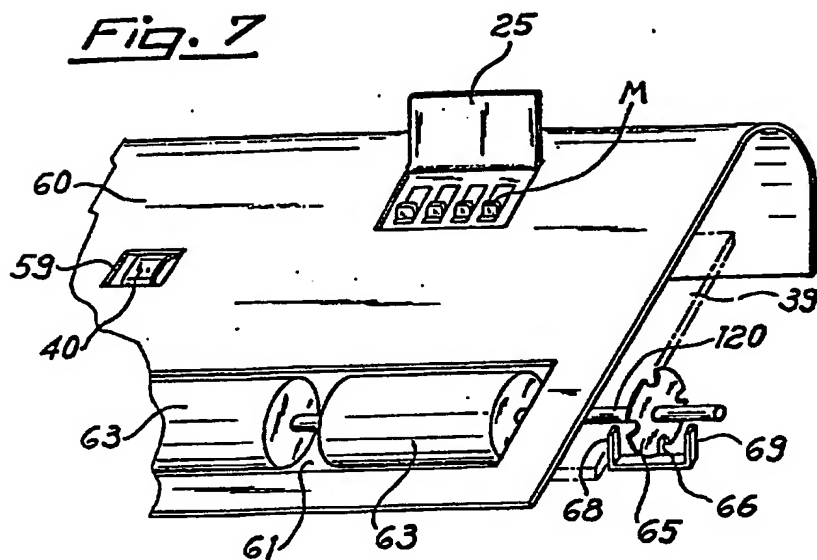


Fig. 9

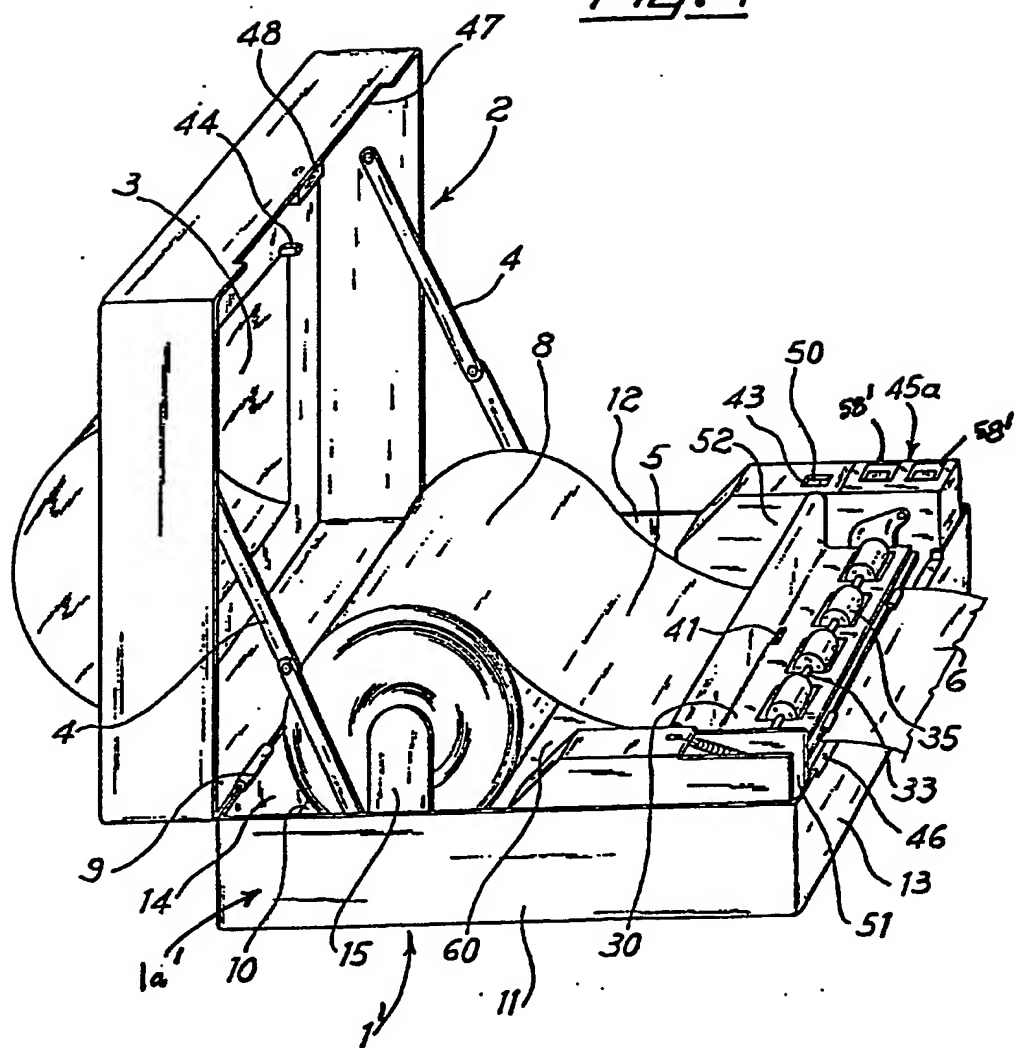


Fig. 10

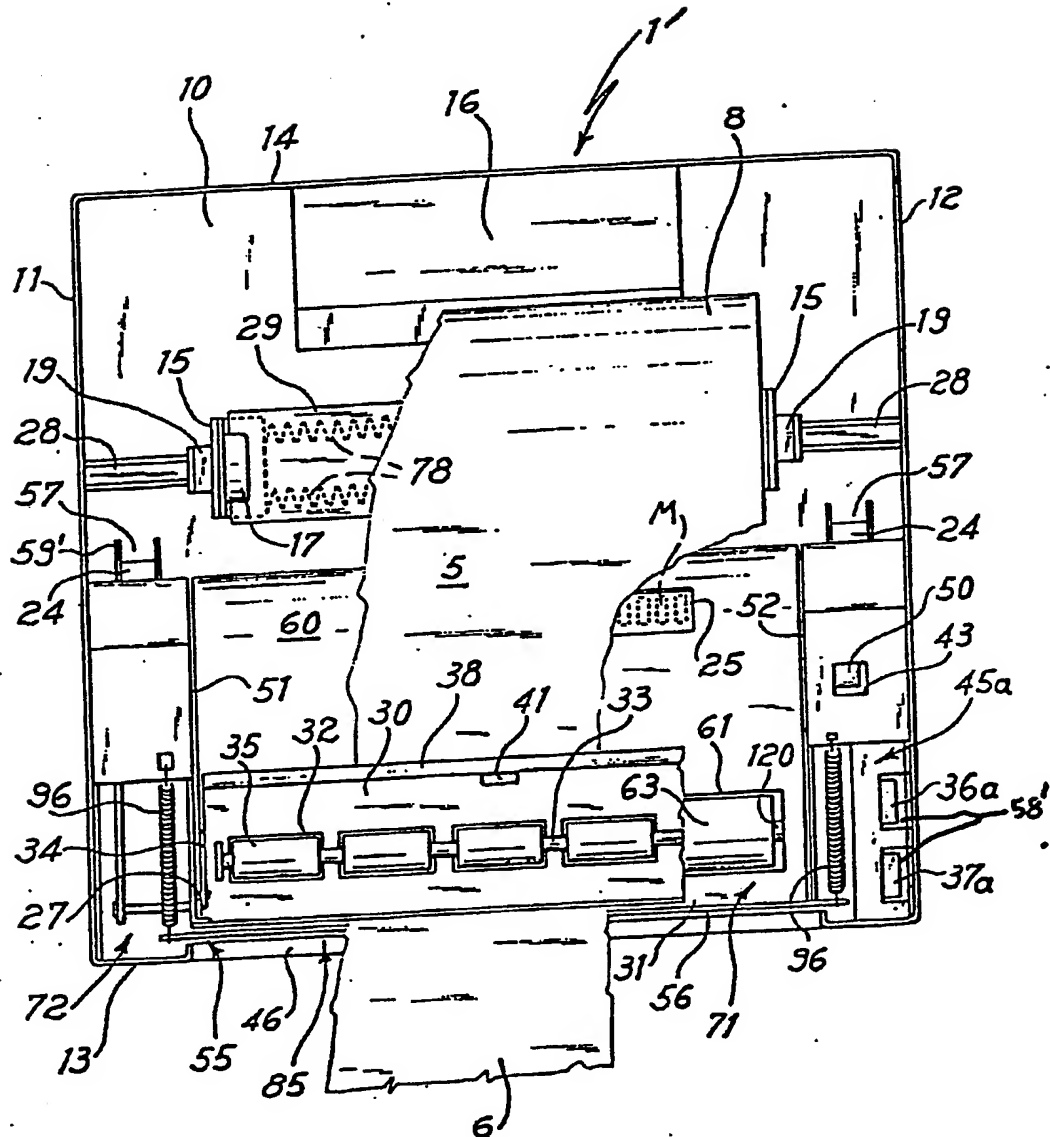


Fig. 11

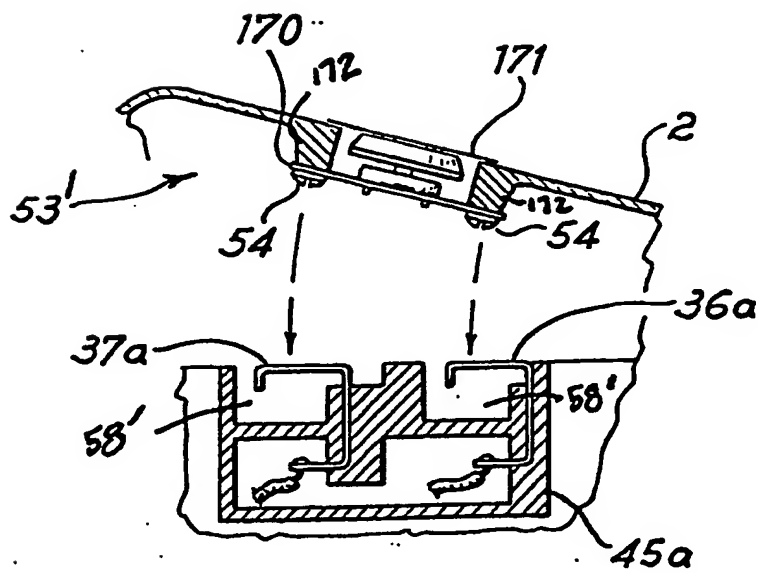
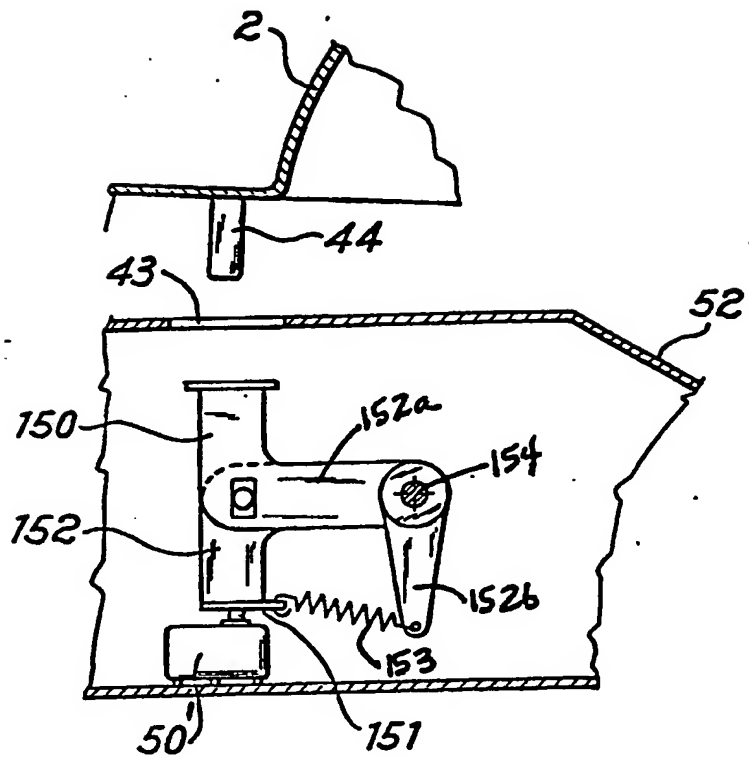


Fig. 12

Fig. 13

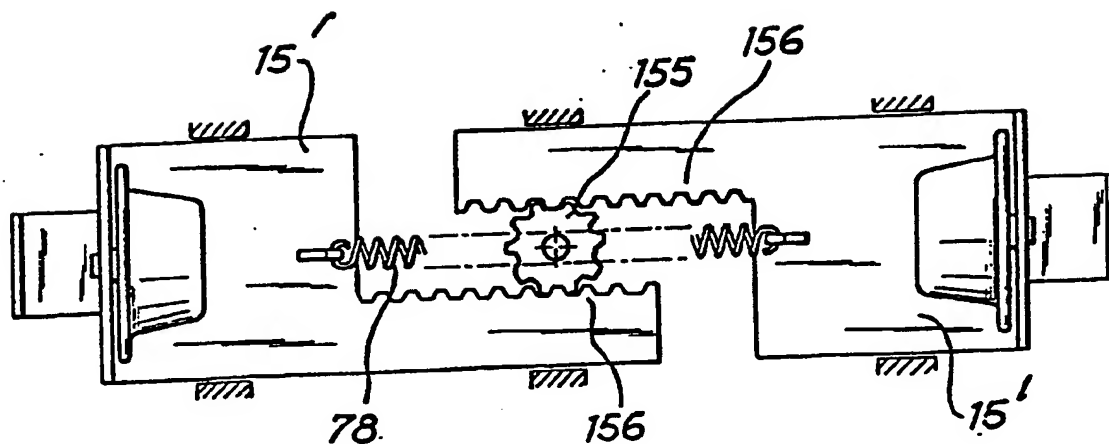


Fig. 14

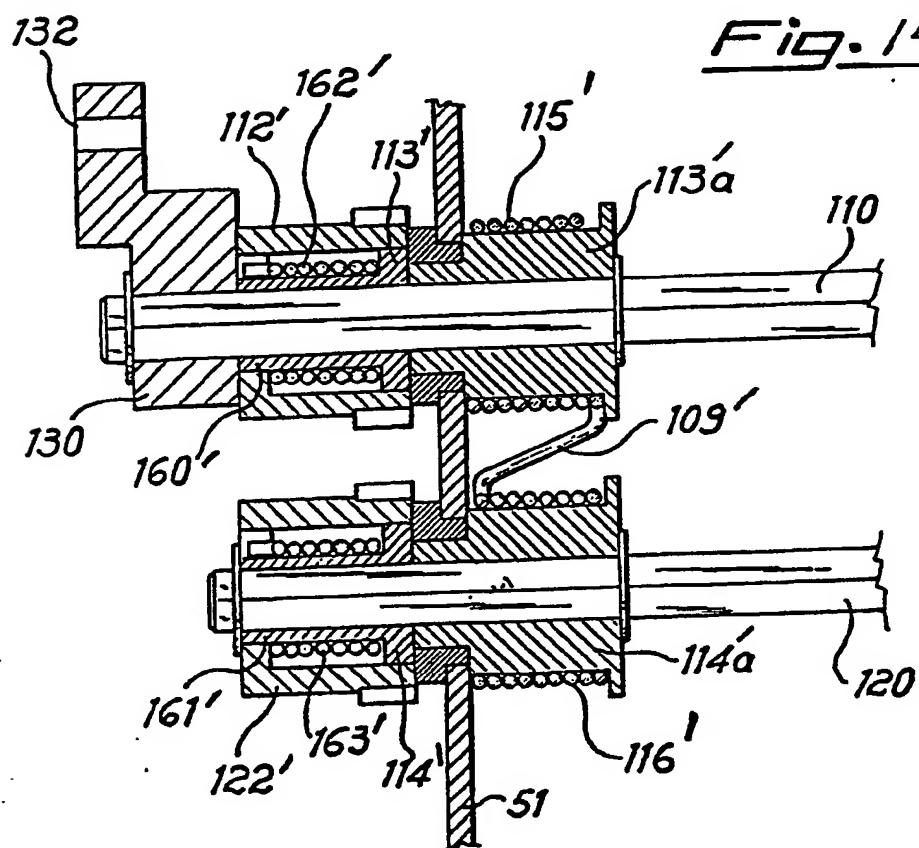


Fig. 15

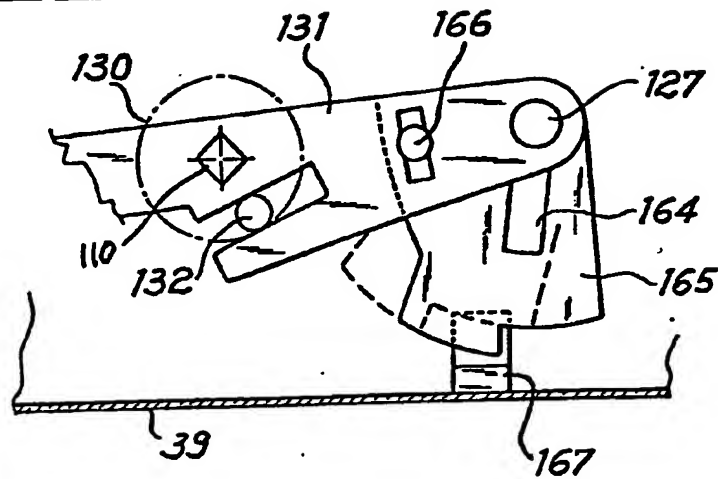


Fig. 16

